

The Mecoptera of Southern Africa

by

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Thirty-one species of Mecoptera are listed from southern Africa. Ten new *Bittacus* species are described; viz. *B. annae*, *B. bullatus*, *B. byersi*, *B. caprai*, *B. cottrelli*, *B. gessi*, *B. pondoensis*, *B. smithersi*, *B. wahlbergi* and *B. zulu*. A key to all southern African species is given.

This paper gives a checklist of the described Mecoptera occurring in southern Africa. It includes descriptions of ten new species, descriptions of females which have not previously been published and distributional data in the form of lists of localities, previously recorded and new, for all the species. A key to the species is provided. Tjeder (1956) grouped a number of southern African species in three species groups viz. the *Bittacus brincki* (now synonymized), *B. selysi* and *B. walkeri* species groups. Londt (1970) suggested a further group, the *B. capensis* species group. None of these species groups has been clearly defined and although the concept is useful, the placing of species in such groups has been avoided. For convenience species have been listed in alphabetical order.

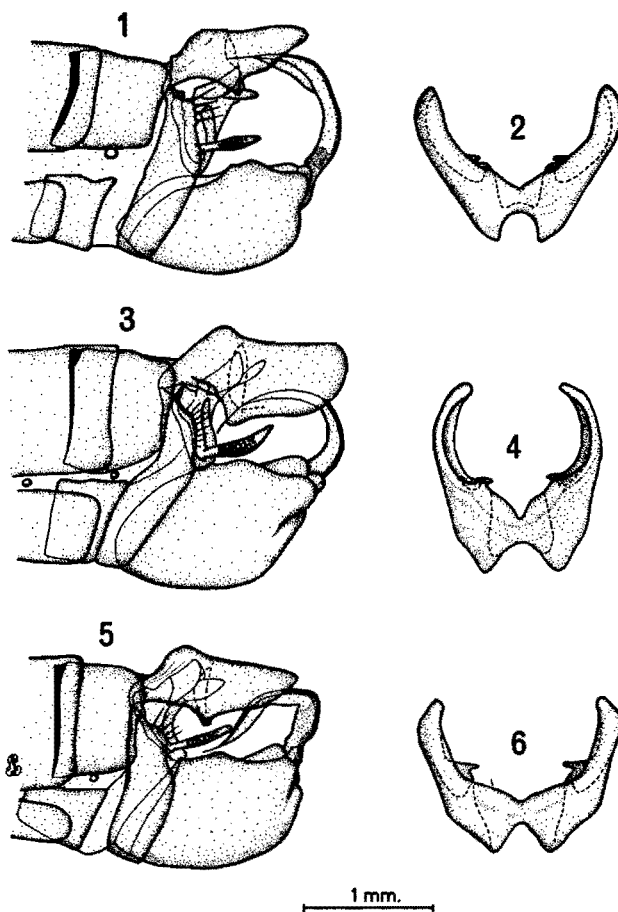
Southern Africa has been arbitrarily defined as that area including the following countries: South West Africa, The Republic of South Africa (R.S.A.), Botswana, Rhodesia, Mozambique south of the Zambezi River, Lesotho and Swaziland. Where any other interesting records are known, these have been included. Regional distribution data is summarized in Table 1, and Table 2 presents the months of the year during which the species have been collected. Fig. 63 reflects the listed localities.

This paper follows from a study of Mecoptera housed in the following museums and private collections:

Albany Museum, Grahamstown, R.S.A.
Barcelona Museum, Barcelona, Spain.
British Museum (Natural History), London, England.
Durban Museum, Durban, R.S.A.
Entomological Institute, Ann Arbor, Michigan, U.S.A.
Londt, J. G. H., Rhodes University, Grahamstown, R.S.A.
National Collection of Insects, Pretoria, R.S.A.
National Museum of Rhodesia, Bulawayo, Rhodesia.
Snow Entomological Museum, Lawrence, Kansas, U.S.A.
Smithers, C. N., Australian Museum, Sydney, Australia.
South African Museum, Cape Town, R.S.A.
Stellenbosch University, Department of Entomology collection, Stellenbosch, R.S.A.
Tjeder, Bo., Lund University, Lund, Sweden.
Transvaal Museum, Pretoria, R.S.A.

Genus *Anomalobittacus* Kimmins, 1928

Anomalobittacus gracilipes Kimmins, 1928, fig. 50



Figs 1-6. *Bittacus* species. 1-2. *B. annae* spec. nov. 1. Lateral aspect of holotype ♂—genitalia. 2. Dorsal aspect of holotype epiandrium. 3-4. *B. byersi* spec. nov. 3. Lateral aspect of holotype ♂—genitalia. 4. Dorsal aspect of holotype epiandrium. 5-6. *B. cottrelli* spec. nov. 5. Lateral aspect of holotype ♂—genitalia. 6. Dorsal aspect of holotype epiandrium.

Anomalobittacus gracilipes Kimmins, 1928: 396, 1 fig.; Wood, 1933: 528, fig. 14; Tjeder, 1956: 385; Byers, 1971: 393-4, figs 1-3.

Although there are good descriptions of the male (Wood, 1933; Byers, 1971), the female has not been described.

Female. General description agrees with that of the male. Genitalia as illustrated (fig. 50). Tergum IX with short dark antecosta; distal tips of cerci more darkly pigmented than proximal parts.

Distribution. Previous records: Cape Town (1 ♂), French Hoek Pass (2 ♂ 1 ♀), Du Toit's Kloof (1 ♂ 1 ♀). New records: French Hoek (1 ♂), Stellenbosch (Jonkershoek Reserve) (8 ♂ 6 ♀).

Notes. Dr J. Theron collected numbers of *A. gracilipes* by means of a "vacuum net" in low vegetation in the Jonkershoek Forest Reserve. Dr V. B. Whitehead supplied the following notes on the habitat in which he collected species in a Malaise trap: "*Anomalobittacus*. Collected in a Townes trap in Henningkloof in the Jonkershoek Forest Reserve 4 miles east of Stellenbosch. This locality is on a perennial stream on the southern slope of the Jonkershoek mountains (near the peaks) and geologically consists of Cape granite overlain by Table Mountain Sandstone skree. Broadly the vegetation is riparian vynbos transition to riparian temperate evergreen broad leaf sclerophyl forest. Canopy cover for the upper stratum (4-5 m) is $\pm 40\%$, for the middle stratum (1-2 m) $\pm 40-50\%$ and for the lower stratum (0-1,5 m) $\pm 60\%$."

Genus *Bittacus* Latreille, 1805

Bittacus alluaudi Navás, 1914, figs. 18-19, 48

Bittacus alluaudi Navás, 1914: 45 fig. 20; Lestage, 1929: 2; Esben-Petersen, 1921: 140; Byers, 1971: 395-8 figs 9-10.

Bittacus jeanneli Navás, 1914: 46-7 fig. 21; Esben-Petersen, 1921: 140-1; Lestage, 1929: 5.

Bittacus zavattarii Capra, 1939: 165-9 figs 4-5.

The male has been well illustrated by both Capra (1939), as *B. zavattarii* and Byers (1971). As there is still doubt as to whether *B. alluaudi* and a central African species, *B. fumosus* Esben-Petersen, 1913, are distinct, illustrations of the newly recorded male material have been given (figs 18-19). This is the first record of this species from southern Africa. The female has not previously been described. Female: Agrees with general descriptions of male; genitalia (fig. 48) similar to *B. natalensis* (Tjeder, 1956, figs 66-70) but tergum IX, in lateral aspect, the same length dorsally as laterally. In *B. natalensis* it is longer dorsally than laterally.

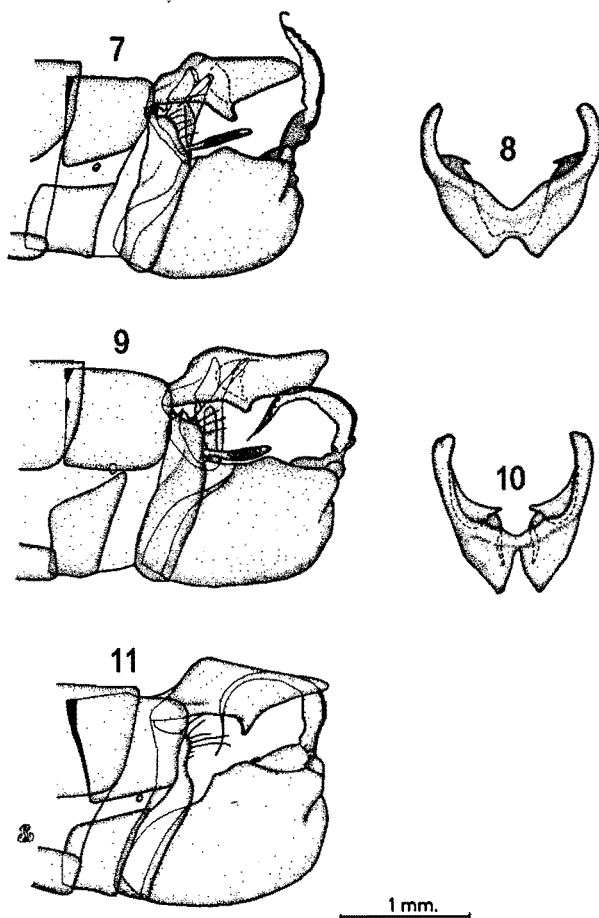
Distribution. New record: Sinoia (2 ♂ 4 ♀).

Bittacus annae spec. nov., figs 1-2, 57

Male, holotype. Head light yellow-brown; ocelli enclosed by a dark marking extending to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; antennae dark reddish brown; scapes and pedicels yellow-brown. Thorax yellow-brown; pronotum with two large dark brown markings laterally; mesonotum with two large dark markings between wing bases, metathorax with two distinct markings at anterior margins of notum; legs yellow-brown; tarsi reddish brown; femora without dark apices; wing venation (fig. 57) light brown; fore wing 23,5 mm, hind wing 21,5 mm. Abdomen yellow-brown; terga with distinct dark antecostae; tergum II with Y-shaped marking mid-dorsally; genitalia as illustrated (figs 1-2).

Unfortunately the holotype lacks the antenna, legs and fore wing on the left side as well as the tarsus of the right fore leg. The female is unknown.

B. annae has close affinities with *B. kimminsi*, *B. byersi*, *B. caprai*, *B. cottrelli* and *B. wahlbergi*. The wings resemble most closely *B. byersi* in both shape and venation. The genitalia, however, display a number of differences from the above species and these are regarded as specific.



Figs 7-11. *Bittacus* species. 7-8. *B. caprai* spec. nov. 7. Lateral aspect of holotype ♂—genitalia. 8. Dorsal aspect of holotype epiandrium. 9-10. *B. gessi* spec. nov. 9. Lateral aspect of holotype ♂—genitalia. 10. Dorsal aspect of holotype epiandrium. 11. *B. kimminsi* Tjeder. Lateral aspect of Cathedral Peak ♂—genitalia.

Distribution. Grahamstown, 21.III.1959, ♂-holotype (D. H. Cumming), coll. J. G. H. Londt.

Bittacus armatus Tjeder, 1956

Bittacus armatus Tjeder, 1956: 360-2 figs 19, 34-46; Smithers, 1959: 183-4; Byers, 1971: 398-9.

Both male and female have been described by Tjeder (1956). The species is very similar to *B. solitarius* and, to a lesser extent, *B. testaceus*.

Distribution. Previous records: Hope Fountain (Rhodesia) (2 ♂ 1 ♀). Minastune (Louis Trichardt dist.) (2 ♂), Barberton (1 ♂), Waterval Onder (1 ♂). New records: Ofcolaco (1 defective), Limburg (Potgietersrus dist.) (1 ♂), Barberton (1 ♂).

Bittacus bullatus spec. nov., figs 23–24, 55–56

Male, holotype. Head yellow-brown with a dark marking enclosing ocelli which extends to inner margins of compound eyes and bases of antennae; rostrum light brown; antennae light brown with yellow-brown scapes and pedicels. Thorax yellow-brown with no distinctive markings; legs yellow-brown; apices of tibiae and fore and middle femora dark brown; tips of first three and whole of fourth and fifth tarsal segments dark brown, remaining parts yellow-brown; hind femora each with a single, distinct, proximal, “inflated” region (fig. 56) bearing approximately 30–50 black spines, predominantly on inner surfaces; hind femora without dark apices; tibial spurs reddish brown; wing venation (fig. 55) brown; fore wing 22,0 mm, hind wing 20,0 mm; wing membrane conspicuously darker in regions of crossveins; pterostigma short, with single pterostigmal crossveins on all four wings. Abdomen yellow-brown; terga with black antecostae; lateral margins of terga II equipped with a few black bristles; genitalia as illustrated (figs 23–24); epiandrium without distinct midventral process in lateral view; epiandrial prongs equipped with 7–8 short black spines distally.

The holotype is in perfect condition. *B. bullatus* is a distinctive species showing a few affinities with *B. selysi*, *B. peterseni*, *B. vumbanus* and *B. zulu*. It also has affinities with a few species occurring north of southern Africa. The extraordinary development of the hind femora and the shape of the epiandrial prongs make this species easily recognisable. The shape of the hind femora has given rise to the name *bullatus* (Latin = inflated).

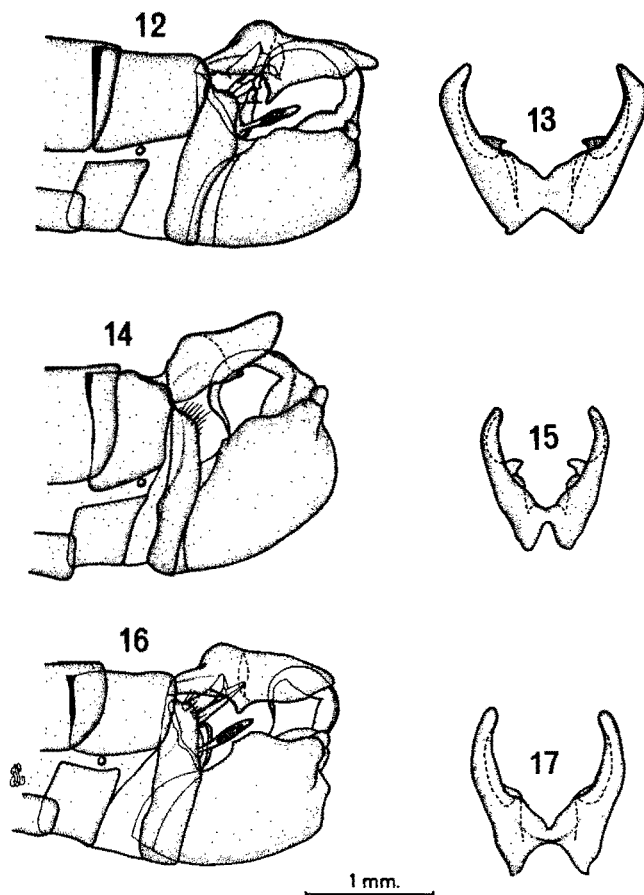
Distribution. Mariepskop, Pilgrim’s Rest dist., 23–26.II.1962, ♂-holotype (Vári & Leleup), Transvaal Museum.

Bittacus byersi spec. nov., figs 3–4, 58

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; distal segments of maxillary palpi brown; antennae dark brown, scapes and pedicels yellow-brown. Thorax yellow-brown except for pronotum which has two dark markings laterally, mesonotum which has two dark markings laterally, anterior to wing bases, and mesonotum which has two dark markings at anterior margin; legs yellow-brown; tarsi brown; femora without dark apices; venation (fig. 58) yellow-brown; fore wing 27,0 mm, hind wing 24,5 mm; wing membrane transparent but tinged with grey along posterior margin; pterostigma about five times as long as broad and with two pterostigmal crossveins on all four wings. Abdomen yellow-brown; lateral margins of terga II and III bear well-developed black bristles; terga V–VIII with narrow black antecostae; genitalia as illustrated (figs 3–4); epiandrial prongs broad in lateral aspect and broadly rounded distally.

Paratypes. 1 ♂, 1 defective; agree with holotype but are old and damaged specimens. The female is unknown.

This large species has affinities with a number of other species including *B. kimminsi*, *B. annae*, *B. caprai*, *B. cottrelli* and *B. wahlbergi* but is larger and possesses



Figs 12-17. *Bittacus* species. 12-13. *B. pondoensis* spec. nov. 12. Lateral aspect of holotype ♂—genitalia. 13. Dorsal aspect of holotype epiandrium. 14-15. *B. wahlbergi* spec. nov. 14. Lateral aspect of holotype ♂—genitalia. 15. Dorsal aspect of holotype epiandrium. 16-17. *B. walkeri* Esben-Petersen. 16. Lateral aspect of Balgowan ♂—genitalia. 17. Dorsal aspect of Balgowan ♂—epiandrium.

distinctive genitalia. This species is named after Professor George W. Byers in recognition of his work on African Mecoptera.

Distribution. Grahamstown [Gunfire Hill], 6.IV.1968, ♂-holotype (P. H. Skelton), coll. J. G. H. Londt; Grahamstown, Stones Hill, J. H. Mar 1926, 1 ♂, paratype, Albany Museum; Grahamstown, IV.1891, 1 defective, paratype (collector illegible), Albany Museum.

Bittacus capensis (Thunberg, 1784)

Panorpa capensis Thunberg, 1784: 67 fig. 78.

Bittacus capensis Klug, 1838: 97; Esben-Petersen, 1913: 138; Banks, 1913: 234; Esben-Petersen, 1921: 134 figs 150-1; Tjeder, 1956: 349-52 figs 1-9; Londt, 1970: 55-7 figs 12-15; Byers, 1971: 401-2.

The male has been described by Esben-Petersen (1921) and Londt (1970), the female by Tjeder (1956) and Londt (1970). This species is similar to *B. smithersi* and to a lesser extent *B. tjederi*.

Distribution. Previous records: "In Capitae bonae spei" (1♀), 'Cape' (1♂), Algoa Bay (Port Elizabeth area) (2♂), Port Elizabeth (36♂, 34♀), Humansdorp (1♀), Kareedouw Mountains (west of Humansdorp) (2♂ 2♀). New records: Port Elizabeth (2♂), Groenvlei (Knysna) (1♂), Knysna (1♀).

Notes. A large number of specimens of this species were captured at Port Elizabeth and brought back to the laboratory in Grahamstown. The insects were found on a south facing slope, near the top of a fairly steep bank of the Bakens River course. They were found in large numbers actively flying about in medium to tall grass and low shrubs. The area was relatively free of tall shrubs and trees. Males were collected carrying prey (usually small Diptera and Cercopidae) and copulating pairs were frequently collected. Only a single female was collected with prey.

Bittacus caprai spec. nov., figs 7-8, 46

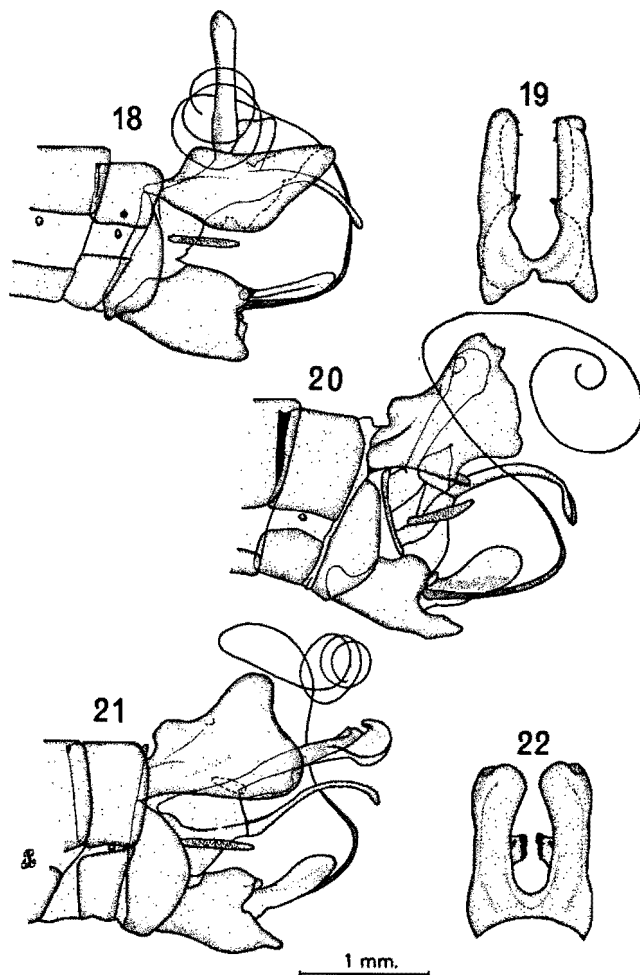
Male, holotype. Head yellow-brown with a dark marking enclosing ocelli which extends to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; antennae almost black except for scapes and pedicels which are light brown. Thorax yellow-brown; pronotum with two lateral dark markings; mesonotum with two dark markings anterior to wing bases; metanotum with two dark spots on anterior margin; legs yellow-brown; tarsi light brown; femora without dark apices; wing membrane transparent; venation similar to *B. wahlbergi* and related species; pterostigma about five times as long as broad with two pterostigmal crossveins on all four wings; fore wing 23,0 mm, hind wing 20,5 mm. Abdomen yellow-brown; terga III-VIII with dark antecostae; genitalia as figs 7-8; epiandrial prongs each with a prominent mid-ventral process in lateral view.

Female, allotype. Agrees with the holotype in general description; colour generally slightly darker than holotype; fore wing 20,0 mm, hind wing 18,5 mm; genitalia as illustrated (fig. 46).

Paratypes. 2♀: agree with descriptions of holo- and allotype.

This species is similar to *B. kimminsi*, *B. wahlbergi* and *B. annae*. Differences in male genitalia, although slight, must be taken as specific. This species has been named after F. Capra in recognition of his work on African Bittacidae.

Distribution. Ndola (Zambia) 10.II.1954, ♂-holotype, ♀-allotype and ♀-paratype, (C. B. Cottrell), coll. J. G. H. Londt; Umtali, 2.II.1945, 1♀-paratype, (P. C. Wright), Albany Museum.



Figs 18-22. *Bittacus* species. 18-19. *B. alluaudi* Navás. 18. Lateral aspect of *Sinoia* ♂-genitalia. 19. Dorsal aspect of *Sinoia* ♂-epiandrium. 20. *B. natalensis* Wood. Lateral aspect of *Skukuza* ♂-genitalia. 21-22. *B. zambezinus* Navás. 21. Lateral aspect of paralectotype ♂-genitalia. 22. Dorsal aspect of paralectotype epiandrium.

***Bittacus cottrelli* spec. nov., figs 5-6, 59**

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; antennae brown; scapes and pedicels yellow-brown. Thorax yellow-brown; prothorax with no distinct markings; mesonotum with two dark markings laterally anterior to wing bases; metathorax with two dark spots at anterior margin of notum;

legs yellow-brown; tarsi brown; femora without dark apices; wing venation (fig. 59) brown; right fore wing with two pterostigmal crossveins while all others have one; fore wing 24,0 mm, hind wing 22,5 mm. Abdomen yellow-brown; terga III-VIII with dark antecostae; genitalia as illustrated (figs 5-6).

This species is similar to *B. kimminsi* and its allies and has been named after C. B. Cottrell who has collected Bittacidae extensively throughout southern Africa.

Distribution. Port St. Johns, IV.1954, ♂-holotype, (C.B. Cottrell), coll. J. G. H. Londt.

***Bittacus gessi* spec. nov., figs 9-10**

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; scapes and pedicels yellow-brown (flagella broken off). Thorax yellow-brown, prothorax without any distinct markings; mesonotum with two dark markings anterior to wing bases; metanotum with two dark spots at anterior margin; legs yellow-brown; tarsi dark reddish brown; apices of femora black; venation light brown; fore wing 26,0 mm, hind wing 23,0 mm. Abdomen yellow-brown, terga III-VIII with dark antecostae; genitalia as illustrated (figs 9-10).

This species is similar to *B. walkeri* and allies. The distinctive shape of the male genitalia leads one to believe that it is a distinct species. The female is unknown.

Distribution. Bizana (Pondoland), V.1956, ♂-holotype (P.O.C.), Albany Museum.

Bittacus kimminsi Tjeder, 1956, fig. 11

Bittacus kimminsi Tjeder, 1956: 375-8 figs 79-92; Byers, 1971: 408.

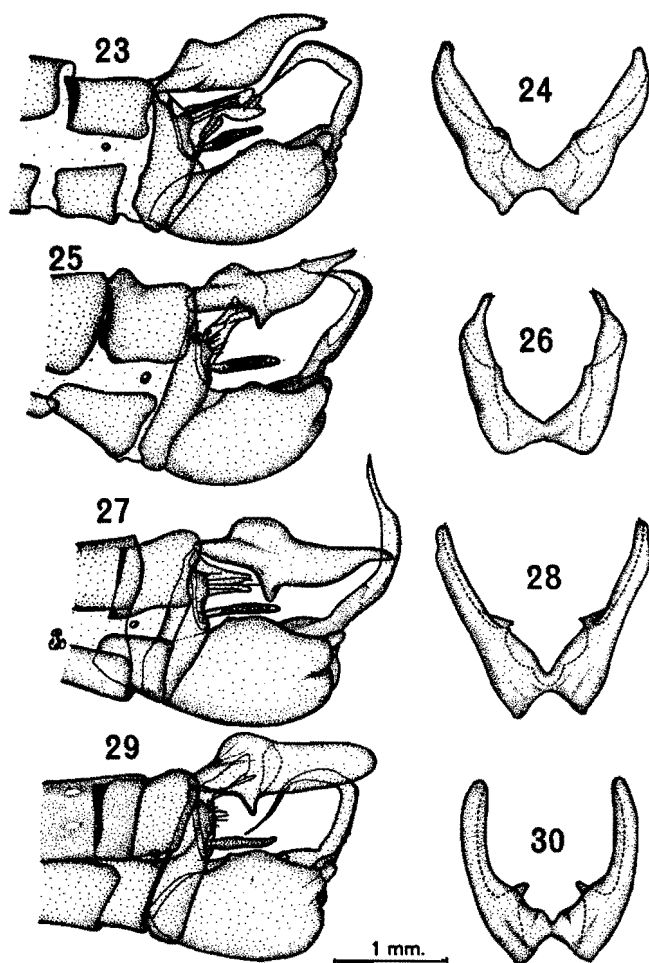
A study of Tjeder's holotype and a few paratypes reveals that one of the females from Camperdown is not *B. kimminsi* but *B. walkeri*. This specimen was collected by G. F. Leigh at approximately the same time as two other specimens collected at Camperdown which were identified by Tjeder (1956) as *B. walkeri*. The other female *B. kimminsi*, from Camperdown, mentioned by Tjeder (1956) can not be traced but there is reason to believe that it will be the same species as the others from Camperdown. The male genitalia have again been illustrated (fig. 11) as a few small points of discrepancy have been found. Tjeder's (1956) descriptions of both sexes are otherwise good.

Distribution. Previous records: Royal National Park, (1♂ 4♀). New records: Cathedral Peak (1♂), Giant's Castle (1♀), Cathedral area (1♀), Natal National Park (3♂).

Bittacus kunenensis Wood, 1933

Bittacus kunenensis Wood, 1933: 513 figs 3-4; Tjeder, 1956: 384; Byers, 1971: 409-10.

A good description of the male is given by Wood (1933); the female is unknown.



Figs 23–30. *Bittacus* species. 23–24. *B. bullatus* spec. nov. 23. Lateral aspect of holotype ♂—genitalia. 24. Dorsal aspect of holotype epiandrium. 25–26. *B. selysi* Esben-Petersen. 25. Lateral aspect of 'Ingele Forest' ♂—genitalia. 26. Dorsal aspect of 'Ingele Forest' ♂—epiandrium. 27–28. *B. sobrinus* Tjeder. 27. Lateral aspect of Cathedral Peak ♂—genitalia. 28. Dorsal aspect of Cathedral Peak ♂—epiandrium. 29–30. *B. zutu* spec. nov. 29. Lateral aspect of holotype ♂—genitalia. 30. Dorsal aspect of holotype epiandrium.

Distribution. Previous records: Otjimbumbe, S.W.A. (1♂).

Bittacus natalensis Wood, 1933, fig. 20

Bittacus natalensis Wood, 1933: 510 figs 1–2; Tjeder, 1956: 369–71 figs 63–70; Smithers, 1961: 130; Byers, 1971: 415–6.

Wood (1933) described the male while Tjeder (1956) described both sexes. This species is very similar to, but quite distinct from *B. zambezinus*. New figures are given of the male genitalia (fig. 20) to facilitate comparison with *B. zambezinus*.

Distribution. Previous records: Chipinda Pools (lower Lundi River) (3♂ 8♀), Louwscreek (1♂), Griffin Mine (near Leydsdorp) (1♀), Bulwer (1♂ 1♀). New records: Satara Rest Camp (Kruger National Park) (1♀), Skukuza (Kruger National Park) (1♂ 1♀), Makanga (Malawi) (1 defective).

The specimen from Malawi was identified as *B. natalensis* by Kimmins and as it was an intact male the identification has been accepted. There is, however, the possibility that the specimen belongs to *B. zambezinus* or some other species.

Bittacus nebulosus Klug, 1838

Bittacus nebulosus Klug, 1838: 99; Walker, 1853: 467; Esben-Petersen, 1913: 138 fig. 1; Banks, 1913: 233; Esben-Petersen, 1921: 138-9 figs 158-9; Lestage, 1929: 7; Wood, 1933: 519 fig. 8; Tjeder, 1956: 352-5 figs 10-5; Byers, 1971: 416-7.

Wood (1933) has given good illustrations of the male and Tjeder (1956) of the female. This is probably the best known and largest of the southern African Bittacidae. It is a distinctive species having only slight similarities to *B. weelei*, *B. kunenensis* and one or two species occurring north of southern Africa.

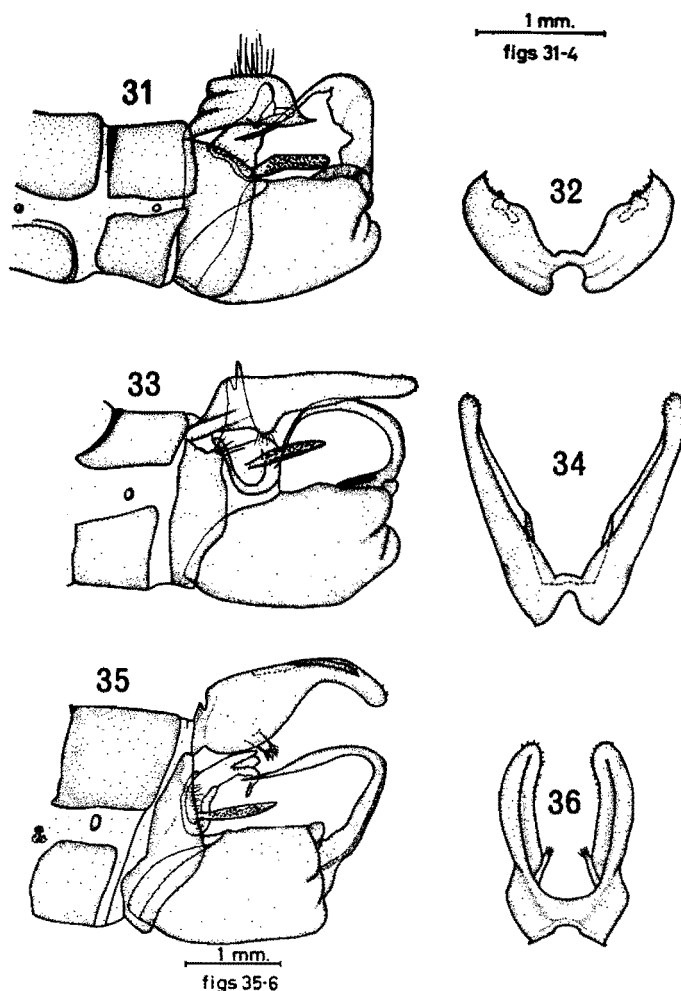
Distribution. Previous records: "South Africa" (1♂), "Caffraria" (2♂ 1 defective). Transvaal: Haenertsburg (1 defective), Barberton (1♂ 1♀). Mozambique: Vallée du Pungué, Guengere. Natal: 'Natal' (1♂), Umbilo (Durban) (1♀), Pinetown (2♂), Upper Tongaat (1♀), Eshowe (1♂). Cape: Port St. Johns (1♀). New records: Transvaal: Tzaneen (1♂ 2♀). Mozambique: 'Delagoa Bay' (2♂). Natal: Champagne [Champagne Castle, Drakensberg] (1♀), Hilton Road (1♀), Ngoye Forest (between Eshowe and Empangeni) (1♂), Umzinto (2♂), Pateni Estates (Richmond dist.) (1♂), N'Kandhla Forest (1♂), Gillits (Pinetown dist.) (2♂ 2♀), Balgowan (5♂ 7♀), Pietermaritzburg (2♂ 2♀), 'Natal' (1♂ 1 defective), Port Shepstone (1♂ 1 defective), Eshowe (1♂), Natal National Park (1♂). Cape: Bedford (1♂ 1♀), Port St. Johns (3♀), Glen Rosa [Paterson dist.] (1♀), Bashee River Mouth (1♂), Kenton-on-Sea (2♂ 3♀), Gxulu River (East London dist.) (4♀), Katberg (2♂ 3♀), Hogsback (1♂), Fern Kloof (Grahamstown) (16♂ 18♀), Paradise Kloof (Grahamstown) (2♂ 3♀), Dassie Krantz (Grahamstown) (5♂ 5♀).

Notes. This species frequents low herbage under the canopy of tall indigenous trees in forests and in kloofs. In the Grahamstown area it has been found mainly in association with *Plectranthus ciliatus* a low broad leaved plant. In Natal *B. nebulosus* is sometimes found in close association with *B. selysi*.

Bittacus peringueyi Esben-Petersen, 1913, figs 33-34

Bittacus peringueyi Esben-Petersen, 1913: 144 fig. 11; Esben-Petersen, 1921: 135-6 figs 154-5; Lestage, 1929: 9; Wood, 1933: 521 fig. 9; Tjeder, 1956: 367-9 figs 59-62; Byers, 1971: 418-9.

Haplodictyus testaceus Navás, 1913: 503 fig. 15.



Figs 31-36. *Bittacus* species. 31-32. *B. smithersi* spec. nov. 31. Lateral aspect of holotype ♂—genitalia. 32. Dorsal aspect of holotype epiandrium. 33-34. *B. peringueyi* Esben-Petersen. 33. Lateral aspect of Grahamstown ♂—genitalia. 34. Dorsal aspect of Grahamstown ♂—epiandrium. 35-36. *B. weelei* Esben-Petersen. 35. Lateral aspect of Kassavassa ♂—genitalia. 36. Dorsal aspect of Kassavassa ♂—epiandrium.

The male has been described by Wood (1933) and the female by Tjeder (1956). Wood's (1933) figure of the male genitalia, although the best to date, is inadequate in a few features so new illustrations have been given (figs 33-34). This species is quite distinct from all other southern African species. The single pterostigmal crossveins, lack of dark markings on the thorax and the dark apices of the femora are excellent field characters for the identification of this species.

Distribution. Previous records: 'South Africa' (1♂), Zoutpansberg (Louis Trichardt dist.) (1♂), 'Natal' (3♀), Krantz Kloof (1♂), Royal Natal National Park (1♂ 1♀), King William's Town (1♂). New records: Natal: Mont-aux-Sources (1♂ 1♀), Howick (1♂), Estcourt (1♂ 1♀), Malvern (?) (1 defective), Devil's Hoek (Royal Natal National Park) (1♀), Tendele (Royal Natal National Park) (4♂ 9♀), Royal Natal National Park (1 defective). Cape: Kokstad (2♀), Hogsback (1♀), Groot Rivier (Knysna) (1♂), Grahamstown (5♂ 7♀).

Notes. Tjeder (1956) noted that *B. peringueyi* had been taken at light and supposed that this phenomenon "is very scarce among the Mecoptera". There are now, however, many records of a number of southern African species being collected at light and it is therefore concluded that the phenomenon is not as uncommon as Tjeder supposed.

Bittacus peterseni Kimmins, 1938, figs 37, 52

Bittacus peterseni Kimmins, 1938: 293 figs A–D; Tjeder, 1956: 383; Byers, 1971: 419.

A good description of the male was given by Kimmins (1938), the holotype being a unique specimen. The Port St. Johns female, recorded below, was sent to Mr P. Ward of the British Museum (Natural History) for comparison with the holotype. His comments were: "I would confirm the identity of your other example as *Bittacus peterseni*, Kimm. ♀."

It is therefore concluded that the two females recorded below represent the female sex of this species.

Female: Head light yellow-brown; ocelli enclosed by a dark marking; rostrum yellow-brown; antennae light yellow-brown. Thorax light yellow-brown; mesonotum with two dark markings anterior to wing bases; metanotum with two faint markings at anterior margin; thorax when viewed laterally with a distinct black spot centrally; legs yellow-brown; femora and tibiae with dark apices; tarsi light brown getting progressively darker towards terminal segment; wings with crossveins shaded light brown; fore wing 22,5 mm, hind wing 21,0 mm (Port St. Johns female), 20,0 mm and 19,0 mm (Bashee female); two pterostigmal crossveins on all four wings; venation as fig. 52. Abdomen yellow-brown, not becoming progressively darker towards distal end but unicolourous; antecostae black; genitalia as illustrated (fig. 37) (Port St. Johns female illustrated).

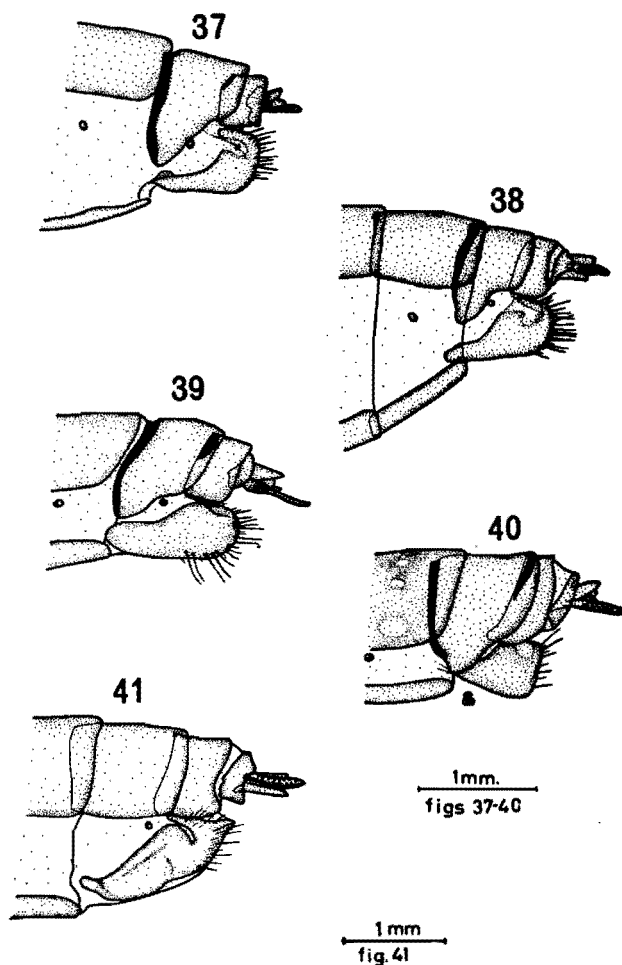
Distribution. Previous records: Chuda River (East London) (1♂). New records: Port St. Johns (1♀), Bashee River Mouth (1♀).

An attempt was made to discover where the type locality of Chuda River is but this has met with little success. Dr H. K. Munro, the collector, has suggested that the Igoda River is probably the locality. A search of this river course in the vicinity of the national highway proved unsuccessful.

Bittacus pinguipalpi Wood, 1933

Bittacus pinguipalpi Wood, 1933: 515 figs 6–7; Tjeder, 1956: 383–4; Byers, 1971: 419.

Wood (1933) described the male of this distinctive species. The female is unknown.



Figs 37-41. *Bittacus* species. 37. *B. peterseni* Kimmins. Lateral aspect of Port St. Johns ♀—genitalia. 38. *B. selysi* Esben-Petersen. Lateral aspect of '20 miles from Kokstad' ♀—genitalia. 39. *B. sobrinus* Tjeder. Lateral aspect of 'Cathedral Peak Area' ♀—genitalia. 40. *B. zulu* spec. nov. Lateral aspect of allotype ♀—genitalia. 41. *B. weelei* Esben-Petersen. Lateral aspect of Ndola ♀—genitalia.

Distribution. Previous record: Narebis, S.W.A. (1♂).

***Bittacus pondoensis* spec. nov., figs 12-13**

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; rostrum yellow-brown; antennae brown with lighter scapes and pedicels. Thorax yellow-brown; pro-

thorax without distinctive markings; mesonotum with two dark markings anterior to wing bases; metanotum with two dark markings at anterior margin; legs orange-brown, femora and tibiae with dark apices; tarsi dark brown; wing membrane transparent; fore wing 25,0 mm, hind wing 22,0 mm; two pterostigmal crossveins in all four wings. Abdomen yellow-brown; terga with distinct black antecostae; genitalia as illustrated (figs 12–13).

This species closely resembles *B. walkeri* and its allies but the shape of the epandrium suggests that it should be considered as a distinct species. The female is unknown.

Distribution. Pondoland, X.1917, ♂-holotype (H. H. Swinny), Transvaal Museum.

Bittacus selysi Esben-Petersen, 1917, figs 25–26, 38, 53

Bittacus selysi Esben-Petersen, 1917: 187 figs 1–2; Esben-Petersen, 1921: 128 fig. 143 & Plate II (fig. 21); Lestage, 1929: 15; Wood, 1933: 522 fig. 10 (not M'fongosi material); Kimmins, 1938: 293 figs A¹–D¹; Tjeder, 1956: 383; Byers, 1971: 421–3 figs 42–44.

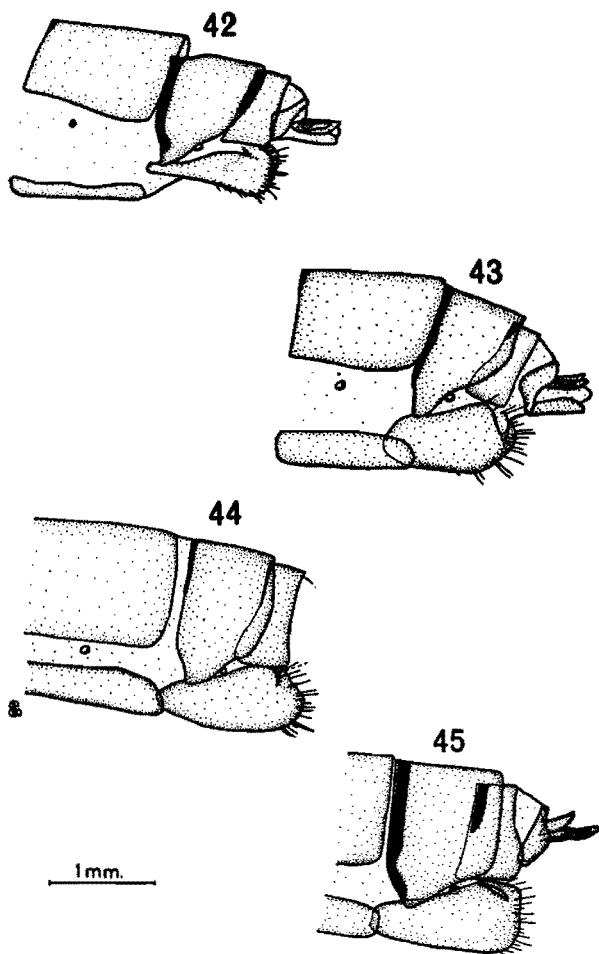
Both Wood (1933) and Byers (1971) have illustrated the holotype male. Other drawings are supplied (figs 25–26) to facilitate comparison with *B. bullatus*, *B. sobrinus* and *B. zulu*, closely related species. Other species which could be confused with *B. selysi* are *B. peterseni* and *B. vumbanus*. The female has not previously been described even though material was available.

Female (based on specimens in my collection). Head orange-brown (yellow-brown in fresh and alcoholic material); ocelli enclosed by a dark marking extending faintly to inner margins of compound eyes and bases of antennae; rostrum light brown; palpi dark brown; antennae orange-brown. Thorax light brown (lighter in alcoholic material); pronotum with faint dark markings laterally; mesonotum with distinct dark markings anterior to wing bases; metanotum unicolourous but sometimes with very faint light brown markings at anterior margin; legs orange-brown; apices of femora, tibiae and tarsal segments dark brown; crossveins of wings darkly shaded (more obvious in some specimens); fore wing 17,5–20,0 mm, hind wing 15,5–18,5 mm (5 specimens measured). Abdomen orange-brown (lighter in alcoholic material) proximally, becoming dark brown distally; terga with dark antecostae; genitalia as illustrated (fig. 38).

The darkly shaded crossveins present in this species appear to be a fairly variable character. Some specimens are only lightly shaded but this shading can usually be seen when the specimen is placed on a white background. An illustration of the wing venation (fig. 53) (Ingele Forest male) has been given to allow comparison with closely similar species.

Distribution. Previous records: Durban (2♂), 5 miles northwest of Pietermaritzburg (3♂ 2♀). New records: Natal: Ingele (? Ngele) Forest (1♂), 20 miles from Kokstad (2♂ 5♀), Pietermaritzburg (7♂ 18♀, 1 defective), Gillits (Pinetown dist.) (3♂ 3♀), Karkloof (6♂ 7♀), Balgowan (6♂ 9♀), Pateni Estates (Richmond dist.) (4♀), Ngome Forest (2♂ 1 defective). Cape: Port St. Johns (1♂ 1♀).

Notes. *B. selysi* is apparently a very common species in the indigenous forests of Natal, frequently being collected together with *B. nebulosus*. *B. selysi* has darkly shaded



Figs 42–45. *Bittacus walkeri* Esben-Petersen. 42. Lateral aspect of a Balgowan ♀—genitalia. 43. Lateral aspect of another Balgowan ♀—genitalia. 44. Lateral aspect of Camperdown ♀—genitalia (10th segment with appendages now detached and mounted in dorsal aspect. This part not illustrated). 45. Lateral aspect of Krantz Kloof ♀—genitalia (Tjeder's *B. angulosus* holotype).

crossveins on its wings, as do all other forest living *Bittacus* species, and it is probable that this character serves as a means of camouflage.

Bittacus smithersi spec. nov., figs 31–32, 49, 62

Bittacus capensis Wood, 1933: 527–8 fig. 13 (Kariega male).

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; rostrum proximally yellow-brown, distally almost black; antennae brown; scapes and pedicels light brown. Thorax yellow-brown; pronotum with two dark spots laterally; mesonotum with two large dark markings laterally anterior to wing bases; metanotum with two dark spots at anterior margin; legs yellow-brown, except tarsi, tibial spurs, apices of femora and tibiae which are black; wing venation (fig. 62) black; fore wing 17,0 mm, hind wing 15,5 mm; membrane transparent; fore wings with single pterostigmal crossveins, hind with two. Abdomen yellow-brown; terga III-VIII with black antecostae; terga II with distinctive Y-shaped dark marking; genitalia as illustrated (figs 31-32); epandrium, when viewed laterally, proximally as broad as centrally.

Female, allotype. Description agrees with holotype; sterna with dark regions midventrally; genitalia as illustrated (fig. 49).

Paratypes. 58 ♂ 65 ♀; pinned and preserved in alcohol; agree with descriptions of holo- and allotypes. There is considerable variation in wing venation especially in regard to number and position of pterostigmal crossveins.

The holotype fore wings possess an interesting crossvein between the base of RS and M (fig. 62). None of the other specimens possess this crossvein. Carpenter (1928) erected a new genus, *Palaeobittacus*, with the single species *P. eocenicus*, basing it largely on just such a crossvein. It is suggested that this character can not be taken as specific, let alone generic, as wing venational characters are in most instances highly variable and have largely lost their significance as diagnostic characters.

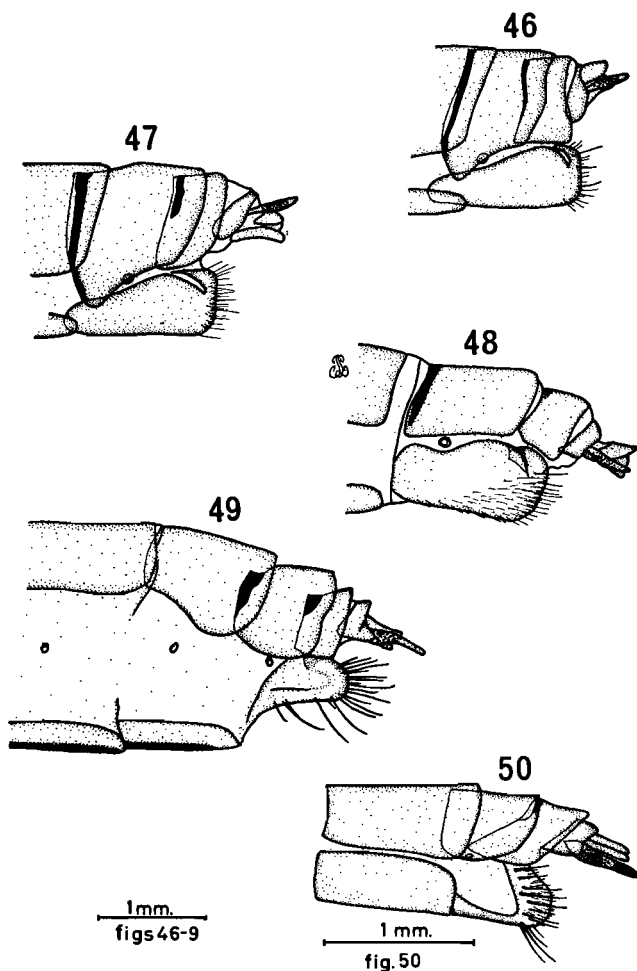
Distribution. Previous records: R.S.A.: Cape Province: Kariega (1 ♂, now defective). Type series: Cape: Grahamstown, Belmont Valley, 26.X.1969, ♂-holotype (J. G. H. Londt); Grahamstown, Belmont Valley, 19.X.-13.XI.1971, 48 ♂ 55 ♀, allotype and paratypes (J. G. H. Londt), Transvaal Museum, South African Museum, Snow Entomological Museum, C. N. Smithers, Bo. Tjeder and J. G. H. Londt; Grahamstown Belmont Valley, 21.X.1971, 10 ♂ 11 ♀, paratypes (F. W. Gess), Albany Museum.

The male described by Wood (1933) as *B. capensis* was thought by Londt (1970) to be in fact *B. capensis* although the drawings published by Wood (1933) did not agree with males from Port Elizabeth. With the capture of the above material from Grahamstown, only a few kilometres from the Kariega River, Wood's drawings have been shown to be accurate and to represent the new species described above. This Kariega male has not been included in the type series as it has lost its terminalia. *B. smithersi* is very similar to *B. capensis* but the shape of the male epandrium, especially in lateral view, is quite distinctive.

Notes. Large numbers of specimens were found in longish grass and low bushes amongst typically indigenous vegetation on a slight southerly slope near Grahamstown. Males were captured with their prey which consisted of Chrysomelidae, Chrysopidae, Lepidoptera larvae, Coleoptera larvae and spiders. Only two females were captured with prey which consisted of a chironomid and a curculionid respectively.

Bittacus sobrinus Tjeder, 1956, figs 27-28, 39, 54

Bittacus sobrinus Tjeder, 1956: 381-2 figs 99-106; Byers, 1971: 424-5.



Figs 46–49. *Bittacus* species. 46. *B. caprai* spec. nov. Lateral aspect of allotype ♀—genitalia. 47. *B. wahlbergi* spec. nov. Lateral aspect of allotype ♀—genitalia. 48. *B. alluaudi* Navás. Lateral aspect of Sinoia ♀—genitalia. 49. *B. smithersi* spec. nov. Lateral aspect of allotype ♀—genitalia. 50. *Anomalobittacus gracilipes* Kimmins. Lateral aspect of Stellenbosch ♀—genitalia.

Tjeder (1956) described this species from a single male taken at Underberg. After a study of the type and two other specimens it became obvious that Tjeder (1956) had drawn the male genitalia when they were pressed between a piece of celuloid and a coverslip. The new illustrations presented here (figs 27–28) are therefore thought to be more accurate. The Cathedral Peak male has been illustrated. Tjeder's holotype was also badly discoloured which led him to describe the species as "dark brownish-

black", when in fact it had a light yellow-brown colour, as is clear from the mounted genitalia. After removal of the type genitalia from the canada balsam in which they were mounted it was ascertained that both males were similar in all important features. The female has not previously been described.

Female (based on the single female recorded below). General description agrees with the holotype (Tjeder, 1956) but is light yellow-brown in colour. Genitalia as illustrated (fig. 39); cerci long and slender at the apex.

An illustration of the Cathedral Peak male fore wing (fig. 54) has been given to allow comparison with *B. selysi* and allies.

Distribution. Previous records: Underberg (1 ♂). New records: Cathedral Peak (1 ♂), Cathedral Peak area (1 ♀).

Notes. A single male was captured at Cathedral Peak on the margin of a pine forest among tall ferns. The specimen was carrying a small fly (Acroceridae) which was lost during capture.

Bittacus solitarius Tjeder, 1956

Bittacus solitarius Tjeder, 1956: 363–4 figs 20, 47–51; Smithers, 1960: 45–6 figs 5–6; Smithers, 1961: 130; Byers, 1971: 425.

Tjeder (1956) described this species from a single female specimen. Smithers (1960) described what he took to be the male, from Rhodesian material. The species is very similar to *B. armatus* and to a lesser extent *B. testaceus*. Tjeder (1956) was probably correct in thinking that Wahlberg collected the type on one of his trips either in Natal or Transvaal, probably the latter, while it is unlikely the 'Caffraria' refers to the Eastern Cape Province (Byers, 1971) as Wahlberg did not visit this region except for stopping over at Port Elizabeth on his way to Cape Town from Durban.

Distribution. Previous records: 'Caffraria' (1 ♀), Inyanga (Rhodesia) (1 ♂ 1 ♀), Umtali (1 ♂ 3 ♀).

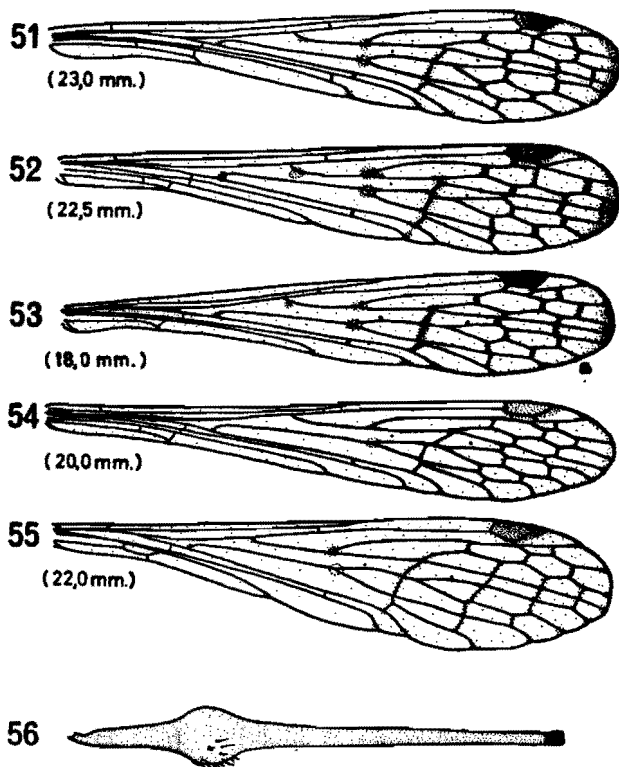
Bittacus testaceus Klug, 1838

Bittacus testaceus Klug, 1838: 98; Walker, 1853: 466; Enderlein, 1910: 398; Esben-Petersen, 1913: 139 fig. 2; Banks, 1913: 234; Lestage, 1917: 119; Esben-Petersen, 1921: 132 figs 147–8; Lestage, 1929: 15; Wood, 1933: 524 fig. 11; Byers, 1971: 426–8 figs 50–2.

Bittacus brincki Tjeder, 1956: 355–60 figs 16–8, 22–3.

Tjeder (1956) described both the male and female of this species (as *B. brincki*) and has pointed out the differences between this species and two closely similar species, *B. armatus* and *B. solitarius*. These three species have in common very long epiandrial prongs in the male sex.

Distribution. Previous records: 'Cape der guten Hoffnung Krebs' (1 ♂ 1 ♀, 1 defective), 'Caffraria' (1 ♂), Louis Trichardt (2 ♂), Moorddrift (1 ♂), Haenertsberg (1 ♂ 1 ♀), Minastune (1 ♀). New records: Rhodesia: Umtali (1 defective). Transvaal: Entabeni Forest (Louis Trichardt dist.) (4 ♂ 1 ♀), Graskop (1 ♀), Sabie (1 ♂), Haenerts-



Figs 51-56. *Bittacus* species. 51. *B. zulu* spec. nov. Right fore-wing of holotype ♂. 52. *B. peterseni* Kimmins. Right fore-wing of Port St. Johns ♀. 53. *B. selysi* Esben-Petersen. Right fore-wing of 'Ingele Forest' ♂. 54. *B. sobrinus* Tjeder. Right fore-wing of Cathedral Peak ♂. 55-56. *B. bullatus* spec. nov. 55. Right fore-wing of holotype ♂. 56. Left metathoracic femur of holotype ♂.

berg (1 ♂ 3 ♀). Orange Free State: Golden Gate (1 ♂). Natal: Durban (1 ♂), Nqutu (1 ♂), Pateni Estates (Richmond dist.) (1 ♂), Estcourt (1 ♂), Royal Natal National Park (1 ♂ 1 ♀). Cape Province: Katberg (1 ♂ 1 ♀), 'Cap bon sp' (1 defective), Somerset East (1 ♂), Cathcart (1 ♂), Bashee River Mouth (1 ♂), Insikeni (1 ♀), Katberg (1 ♂), Uitenhage (1 ♀), Port St. Johns (1 ♂), Grahamstown (14 ♂ 25 ♀).

Notes. This species has been collected in long grass in the shelter of trees and bushes. Specimens were captured in the same situations as yielded *B. smithersi*, in Grahamstown, but were collected a few weeks later. This species occurs in light traps or comes to lights at private houses.

Bittacus tjederi Londt, 1970

Bittacus tjederi Londt, 1970: 53-5 figs 1-11; Byers, 1971: 428.

Londt (1970) described both male and female and gave illustrations of genitalia and wings. The species is similar to *B. capensis* and *B. smithersi* but can be separated from both by the characteristic shape of the male epiandrium and a few other less obvious characters.

Distribution. Previous records: Goedehoop (Heidelberg dist.) (21♂ 16♀). New records: Swellendam (1♂ 2♀).

Bittacus vumbanus Smithers, 1960

Bittacus vumbanus Smithers, 1960: 46–9 figs 1–4, 7; Byers, 1971: 428–9.

Both male and female of this distinctive species have been described by Smithers (1960). This species has affinities with *B. selysi*, *B. zulu*, *B. peterseni*, *B. bullatus* and *B. sobrinus* but can be easily separated from these species by the characteristic shape of the male epiandrium.

Distribution. Previous records: Vumba Mountains (near Umtali) (8♂ 9♀). New record: Chirinda Forest (1♂ 2♀).

Bittacus wahlbergi spec. nov., figs 14–15, 47, 60

Male, holotype. Head yellow-brown; ocelli enclosed by a dark marking which extends to inner margins of compound eyes and bases of antennae; antennae light brown, scapes and pedicels yellow-brown; rostrum yellow-brown. Thorax yellow-brown; prothorax with no distinct markings; mesonotum with two light brown markings anterior to wing bases; metanotum with two light brown spots at anterior margin; legs yellow-brown; femora without dark apices; tarsi brown; wing venation (fig. 60) yellow; membrane transparent; pterostigma yellow-brown with two pterostigmal crossveins on all four wings; fore wing 23.5 mm, hind wing 21.5 mm. Abdomen yellow-brown with no distinct dark antecostae; genitalia as illustrated (figs 14–15). Specimen slightly teneral.

Female, allotype. General description agrees with holotype; genitalia as illustrated (fig. 47). Slightly teneral.

Paratypes. 1♂ 2♀; agree with descriptions of holo- and allotype in all important details. One female paratype is more extensively marked while the other appears slightly teneral as are the holo- and allotypes. The paratype male has unfortunately lost the terminal segments of the abdomen through an accident but as these had already been examined it is possible to state that it belongs to this species.

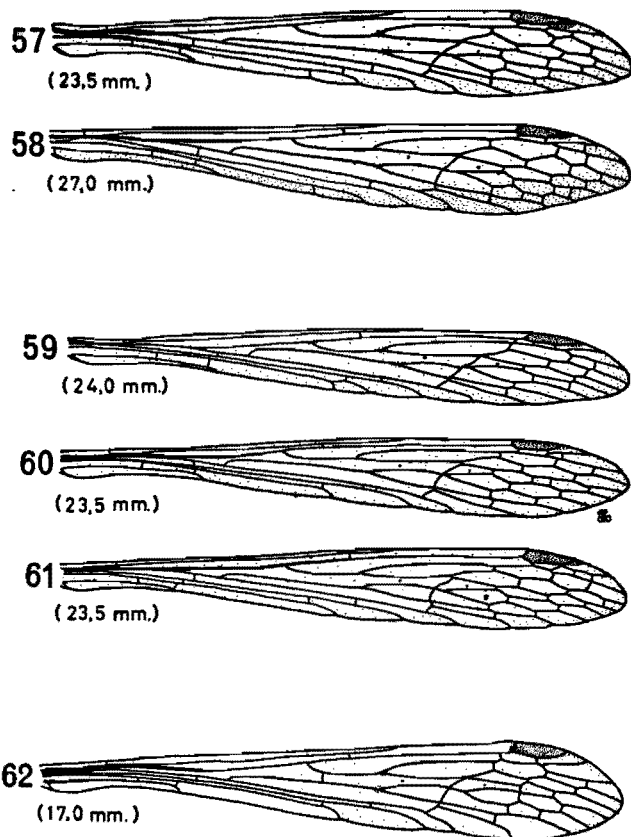
B. wahlbergi resembles *B. kimminsi* and its allies.

Distribution. Hogsback, II.1942, ♂-holotype, ♀-allotype and 2♀-paratypes, (R.W.R.), Albany Museum, Transvaal Museum, coll. J. G. H. Londt; Hogsback, 13.II.1942, 1♂-paratype (now defective), (P. McGaffin), coll. J. G. H. Londt.

Bittacus walkeri Esben-Petersen, 1915, figs 16–17, 42–45, 61

Bittacus capensis Walker, 1853: 465.

Bittacus walkeri Esben-Petersen, 1915: 236–7; Esben-Petersen, 1917: 189 figs 3–4; Esben-Petersen, 1921: 131 fig. 146; Wood, 1933: 525–6 fig. 12a–c; Tjeder, 1956: 371–4 figs 71–8; Byers, 1971: 429–30 figs 53–4; Smithers, 1971: 189.



Figs 57–62. *Bittacus* species. 57. *B. annae* spec. nov. Right fore-wing of holotype ♂. 58. *B. byersi* spec. nov. Right fore-wing of holotype ♂. 59. *B. cottrelli* spec. nov. Right fore-wing of holotype ♂. 60. *B. wahlbergi* spec. nov. Right fore-wing of holotype ♂. 61. *B. walkeri* Esben-Petersen. Right fore-wing of Hilton ♂. 62. *B. smithersi* spec. nov. Right fore-wing of holotype ♂.

Bittacus kimminsi Tjeder, 1956: 375–8 (Camperdown females only).

Bittacus angulosus Tjeder, 1956: 378–81 figs 93–8; Byers, 1971: 398. **Syn. nov.**

After a study of all the specimens recorded below, with exception of the *B. walkeri* holotype, it has been decided that *B. angulosus* must fall as a synonym of *B. walkeri*. As a personal study of the holotype was impossible, a male, collected at Hilton and previously identified by Tjeder as *B. angulosus* (Taylor, 1968), was sent to Mr P. Ward at the British Museum (Natural History) for comparison with the type. The comments received were:—

"Your specimen collected at Hilton is confirmed as *Bittacus walkeri* E.P. I removed the holotype genitalia from the slide mount and found that, as you suspected, they had been distorted in the preparation. I examined them together with your own example, in glycerine. The points of comparison are as follows:

The lateral aspect of the epiandrium of the Hilton male is slightly broader than the type, with the apex forming a less acute angle. The ventral tooth of the type is now clearly apparent and agrees closely with your example.

There is a slight degree of difference visible in the ninth sternum, but hardly more than might be called variation. Most of the setae are missing from the type, rendering it impossible to compare the arrangement of these.

The gonocoxites are, to all appearances, identical; there is no appreciable difference between the colour and markings of the two specimens."

Tjeder (1956) used a single female from Krantz Kloof as his holotype of *B. angulosus*. The male, collected at the same locality, which Tjeder (1956) placed in this species without actually examining, had previously been studied by both Esben-Petersen (1917) and Wood (1933) and assigned to *B. walkeri*. No appreciable differences can be seen between this male and numerous males from the localities listed below.

Tjeder (1956) also illustrated a female from Camperdown and determined it, along with an unillustrated male from the same locality, as *B. walkeri*. He placed these specimens in *B. walkeri*, basing his action on a comparison of the male genitalia with a sketch of the type sent to him by Mr D. E. Kimmins, then of the British Museum. This Camperdown male has been re-examined and agrees with all other males studied. The Camperdown specimens are slightly larger and appear to be slightly teneral when compared with the other material studied. As Tjeder (personal communication) has correctly pointed out, the Camperdown female and the Krantz Kloof female, which look different on first inspection, must be shown to belong to a single species population showing this range in variation. Two Balgowan females have been illustrated (figs 42-43) which give an indication of the variation within the females from a single locality, collected over a few days. It is suggested that the variation seen in these two Balgowan females is of the same order as that seen between the Camperdown female (fig. 44) and the Krantz Kloof female type of *B. angulosus* (fig. 45).

Should the differences seen between the Camperdown female and the Krantz Kloof female not be accepted as variation then it is the Camperdown female which is not true to form as the females from Hilton and Balgowan, whose males agree with the type of *B. walkeri*, agree well with the Krantz Kloof female. One would therefore have to erect a new species for the Camperdown material. As it is believed that all the above specimens belong to the same species the erection of a new species has not been undertaken.

B. walkeri is, however, very similar to a number of other species described in this paper. The differences seen in the male epiandria, in most instances, are not very great. New species have been erected for these forms in order to draw attention to the differences which can be seen. It may eventually be proved that such species as *B. gessi* and *B. pondoensis* are merely geographical or individual variants of *B. walkeri*. More specimens will, however, be needed before this matter is settled. In order to facilitate comparisons figures of what has been considered to be a 'typical' *B. walkeri* male have been given (figs 16-17).

Distribution. Previous records: 'South Africa' (1♂), Camperdown (1♂ 1♀), Krantz Kloof (1♂ 1♀), Umgeni Valley (above Nagle Dam) (1♂). New records: Natal:

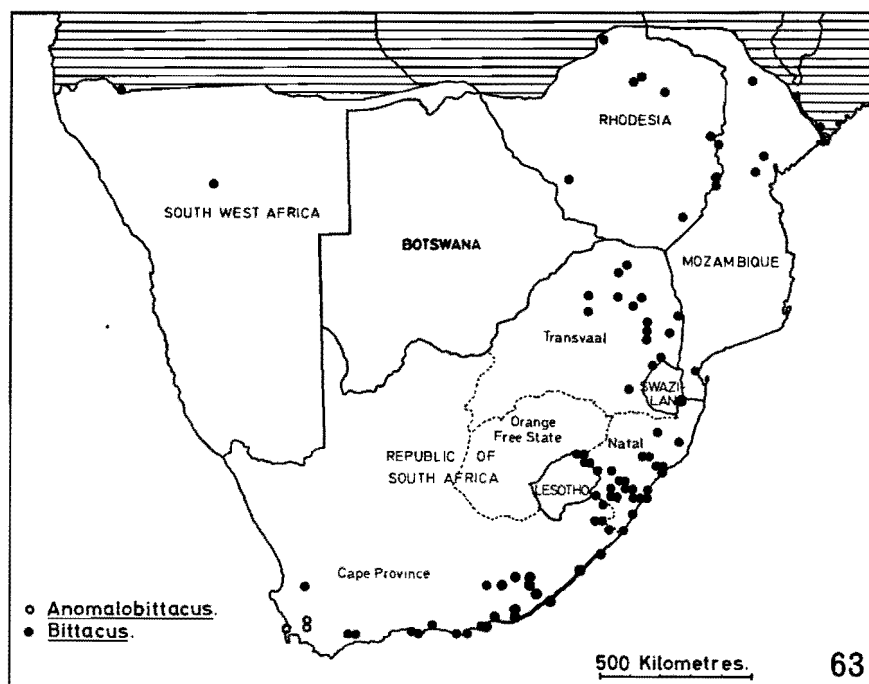


Fig. 63. The distribution of *Bittacus* and *Anomalobittacus* in southern Africa.

Camperdown (2♀), Hilton (1♂ 1♀), St. Helier (Botha's Hill) (1♂), 'Natal' (1♂), Gindhlovu (1♀), Weza (1♀), Balgowan (20♂ 25♀). Cape: Port St. Johns (1♂).

Notes. Mr K. Pennington supplied the following brief note concerning the locality and behaviour of *B. walkeri* collected by him at Balgowan. "They were taken between 9.30 and 10.15 a.m. on a sunny day—today—in grass from 4–5 feet high, 10–12 yards from the fringe of the forest ($\pm 4\ 700'$). They usually settled 3–5 feet high on a blade or stem of grass and were easy to net."

Bittacus weelei Esben-Petersen, 1913, figs 35–36, 41

Bittacus testaceus Weele, 1909: 21 fig. 3.

Bittacus weelei Esben-Petersen, 1913: 142–3 figs 7–8; Lestage, 1917: 112–3; Esben-Petersen, 1921: 139–40 fig. 160; Lestage, 1929: 16; Navás, 1930: 311; Capra, 1939: 177–8; Smithers, 1959: 183; Byers, 1971: 430–2 figs 55–6; Smithers, 1971: 189.

Bittacus negus Navás, 1915: 397.

Bittacus longistigma Navás, 1926: 89–90 fig. 4.

Bittacus wittei Navás, 1933: 315–6 fig. 93.

Although Byers (1971) gives adequate figures of the male genitalia he leaves out details of the tenth segment and associated structures. Illustrations of a male, taken at Kassavassa (Zambia), have been given (figs 35–36) which show these details. The

female has not previously been described. The genitalia of a female from Ndola (Zambia) are therefore illustrated (fig. 41). In all other respects the sexes are alike. The female genitalia bear a strong resemblance to those of *B. nebulosus* (Tjeder, 1956) and it is possible that *B. weelei*, a very large and distinctive species, is more closely related to *B. nebulosus* than to any other species.

Although Zambia falls outside the area defined as 'southern Africa' these specimens have been recorded as they were the only specimens available at the time of this study.

Distribution. Previous records from southern Africa: Rhodesia: Zwipani (Urungwe Reserve) (2 ♂ 1 ♀). Mozambique: Zambezi Mouth (1 ♂). Material used for figures: Zambia: Kassavassa (1 ♂), Ndola (1 ♀).

Notes. A very widely distributed species in Africa, collected frequently in light traps. Numerous specimens have been seen from light traps in Nigeria and Uganda.

Bittacus woodi Smithers, 1959

Bittacus montanus Wood, 1933: 517 (Salisbury material); Tjeder, 1956: 364–7 (Salisbury material).

Bittacus woodi Smithers, 1959: 180–3 figs 1–5; Byers, 1971: 432–3.

Both sexes of this species have been described and illustrated by Smithers (1959). *B. woodi* resembles *B. montanus* Weele, a central African species, and also has similarities with *B. berlandi* Capra another species not occurring in southern Africa.

Distribution. Previous records: Zwipani (Urungwe Reserve) (4 ♂), Salisbury (9 ♂ 10 ♀). New records: Salisbury (1 defective), Sinoia (1 ♂), Mtorashanga (S. of Banket) (2 ♂ 3 ♀), Moshi (Tanzania) (1 ♂).

The record from Tanzania is included as it is the only record of this species outside of southern Africa. This record extends the known distribution considerably which at first appears doubtful, especially as *B. montanus* is found in the Moshi area. The genitalia, however, agree perfectly with *B. woodi*. The unique type of *B. berlandi* collected in the "Vicinity of Moshi" (Byers, 1971) has not been examined. There is however the possibility that these two species are synonymous.

Bittacus zambezinus Navás, 1931, figs 21–22

Bittacus zambezinus Navás, 1931: 106–7 fig. 51a–b; Tjeder, 1956: 384; Byers, 1971: 433–5 figs 57–9.

Tjeder (1956) was of the opinion that *B. zambezinus* and *B. natalensis* were possibly synonymous. As he had not examined the *B. zambezinus* material, he was unable to support this suggestion. Byers (1971) illustrated the male syntype in the Barcelona Museum, from a dry undissected specimen, and labelled the illustrations as being those of the lectotype he selected, which is in the Paris Museum. He maintained that there were no differences between the two specimens. The genitalia of the Barcelona male 'paralectotype' have been studied and it has been found that the drawings of Byers (1971) are not accurate in the details of the tenth abdominal segment and associated structures. New illustrations of these genitalia are therefore given (figs 21–22).

The main difference which is evident between the figures given here and those of Byers (1971) pertain to the supraanale (proctiger of Byers) which is shown as a short broad structure by Byers (1971) whereas it is far more like *B. natalensis* in being long and 'clubbed' at the distal end. The dried supraanale therefore extended greatly and 'unfurled' when soaked in macerating fluid. *B. zambezinus* is distinct from *B. natalensis* in the shape of the epiandrial prongs, gonocoxites and other less obvious features. The female is undescribed.

Distribution. Previous records: 'Nova Choupanga prés Chemba' (2 ♂ 1 ♀).

***Bittacus zulu* spec. nov., figs 29–30, 40, 51**

Bittacus selysi Wood, 1933: 522–4 (M'fongozi specimens only); Tjeder, 1956: 383 (M'fongozi records only); Byers, 1971: 421–3 (Zululand records only).

Male, holotype. Head orange-brown; ocelli enclosed by a dark marking; rostrum orange-brown; antennae yellow-brown; scapes and pedicels orange-brown. Thorax orange-brown with no distinctive markings; legs yellow-brown; apices of femora and tibiae dark brownish black; tarsal segments yellow-brown except for tips of first two and whole of last three segments which are brown; venation (fig. 51) light brown; fore wing 23.0 mm, hind wing 21.0 mm; wing membranes conspicuously darker in regions of crossveins; two pterostigmal crossveins in all four wings. Abdomen orange-brown; tergum II with distinct mid-dorsal longitudinal black stripe running two thirds of length of tergum; cleared terminalia show tergum VII with a few clear spots (i.e. lightly pigmented) (fig. 29) which lack hairs; genitalia as illustrated (figs 29–30); epiandrium, in lateral aspect, broadly rounded distally.

Female, allotype. General description agrees with that of the holotype; lightly pigmented spots of tergum VII larger and more distinct; genitalia as illustrated (fig. 40).

Paratypes. 2 ♂ 3 ♀; agree with descriptions of holo- and allotype; one female is slightly lighter in colour and does not show the dark stripe on tergum II; male paratypes show slightly narrower epiandria in lateral view but no more than can be termed individual variation.

Distribution. M'fongozi, Zululand, April–May 1934, ♂-holotype, ♀-allotype (W. E. Jones), South African Museum; M'fongozi, Zululand, Dec. 1916, 1 ♀-paratype (W. E. Jones), South African Museum; Hluhluwe Reserve, 8.X.1970, 2 ♂ 2 ♀, paratypes (H. Townes), coll. J. G. H. Londt.

There are also 2 ♂, 2 ♀ and 1 defective specimen in the Entomological Institute of America, collected by Townes at Hluhluwe together with the above material from that locality. I have not included these in the type series as they were not available at the time of describing the species.

It is odd that Wood (1933) should record 1 ♂ and 2 ♀ from M'fongozi, which he called *B. selysi*, collected in December 1916, as only one female has this label data while the other two specimens are labelled 1934, the year after Wood's paper. The only explanation is that the labels have been reprinted and the incorrect data supplied.

B. zulu closely resembles *B. selysi*, especially in the females, but can be easily separated using male epiandrial characters.

Notes. Dr H. Townes collected his material in short grass in the shade of indigenous trees, the situation being fairly open and not forest-like.

Bittacus sp.

A single specimen labelled 'Citrusdal dist., November 1948, South African Museum expedition' has been studied. This is the most western record of a *Bittacus* apart from the two South West African specimens. It is certain that this Citrusdal specimen, now defective, represents a new species. As this is the only specimen it would be unwise to describe a new species on a single damaged specimen. The species is smaller than *B. capensis* but is otherwise very similar to *B. capensis*. The specimen, however, does not have the characteristic markings of the head possessed by *B. capensis* and its allies, *B. tjederi* and *B. smithersi*. The ocelli are enclosed only by a small black spot. Apart from placing this interesting locality on the map supplied (fig. 63), no further reference to this specimen will be made.

A KEY TO THE SOUTHERN AFRICAN BITTACIDAE (ADULTS ONLY)

As very few really reliable morphological characters are used in the taxonomy of Bittacidae, it is not easy to construct a key to the species. In many of the species the females are either unknown or undescribed, and the differences between the males only fully appreciated by studying the genitalia. For these reasons it has not been possible to produce a key which will allow each species to be keyed out separately. The key supplied will, in some instances, allow a specimen to be keyed out only to a group of species, usually closely similar in genital morphology.

- | | | |
|----|---|----------------------------|
| 1 | Two pairs of well-developed wings present (Genus <i>Bittacus</i>) | 2 |
| | Wings represented by slender filaments only, shorter than length of thorax (Genus <i>Anomalobittacus</i>). A single species known | gracilipes |
| 2 | First anal vein reaches wing margin beyond the level of the first forks of the radial sector and median vein | 3 |
| | First anal vein reaches wing margin before the level of the first forks of the radial sector and median vein | 5 |
| 3 | Wing membrane with distinct dark markings; femora with dark apices; costal area often with two crossveins | nebulosus |
| | Wing membrane without distinct dark markings; femora without dark apices; costal area with a single crossvein | 4 |
| 4 | Pterostigma more than five times as long as broad | weelei |
| | Pterostigma less than five times as long as broad | kunenensis |
| 5 | All crossveins more or less strongly shaded (more obvious when studied using the naked eye and a white background); pterostigma very strongly pigmented | 6 |
| | Crossveins not strongly shaded; pterostigma not very strongly pigmented | 9 |
| 6 | Hind femora each with a single distinct bulbous swelling proximally | bullatus |
| | Hind femora without bulbous swellings | 7 |
| 7 | Terminal abdominal segments distinctly darker than proximal ones | selysi, vumbanus |
| | All abdominal segments unicolourous | 8 |
| 8 | Tergum VII with two or three lightly pigmented, hairless, spots laterally | zulu |
| | Tergum VII without lightly pigmented spots laterally | peterseni |
| 9 | Thorax with dark markings dorsally; head with dark marking enclosing ocelli and extending to inner margins of compound eyes and bases of antennae | 10 |
| | Thorax unicolourous; ocelli enclosed by only a small dark spot | 14 |
| 10 | Rostrum distally much darker than proximally | 11 |
| | Rostrum distally only slightly darker than proximally | 12 |
| 11 | Venation light brown | tjederi |
| | Venation black | capensis, smithersi |
| 12 | Pterostigma more than twice as long as broad | 13 |
| | Pterostigma less than twice as long as broad | sobrinus |

- 13 Femora with distinct dark apices **walkeri, gessi, pondoensis**
Femora without distinct dark apices **kimminsi, annae, byersi, caprai, cottrelli,**
wahlbergi
14 All four wings with single pterostigmal crossveins **peringueyi**
Two pterostigmal crossveins present in at least one of the wings 15
15 Wing membrane strongly tinged with brown; fore femora gradually darkened towards
apices (Note: a few *B. woodi* sometimes possess this character) **natalensis, zambezinus,**
alluaudi
Wing membrane not strongly tinged with brown; fore femora unicolourous for most of
their length 16
16 Maxillary palpi densely pubescent; with a small tapering apical segment; wings less than
18 mm in length **pinguipalpi**
Maxillary palpi not densely pubescent; wings longer than 18 mm 17
17 Femora with dark apices **armatus, solitarius**
Femora without dark apices **testaceus, woodi**

TABLE 1. Summary of geographical distributions of southern African Mecoptera.

	S.W. Cape	Orange Free State	Cape & Transkei	Natal	Transvaal	S.W. Africa	Rhodesia	Mozambique	N. of sthn. Africa
<i>A. gracilipes</i>	+								
<i>B. alluaudi</i>									+
<i>B. annae</i>			+				+		
<i>B. armatus</i>					++		+		
<i>B. bullatus</i>					+				
<i>B. byersi</i>			+						
<i>B. capensis</i>	+		+						
<i>B. caprai</i>			+				+		+
<i>B. cottrelli</i>			+						
<i>B. gessi</i>			+	+					
<i>B. kimminsi</i>						+			
<i>B. kunenensis</i>									
<i>B. natalensis</i>				+	+		+		+
<i>B. nebulosus</i>			+	+	++			+	
<i>B. peringueyi</i>	+		+	+	+				
<i>B. peterseni</i>			+						
<i>B. pinguipalpi</i>						+			
<i>B. pondoensis</i>			+						
<i>B. selysi</i>			+	+					
<i>B. smithersi</i>			+						
<i>B. sobrinus</i>				+					
<i>B. solitarius</i>				+			+		
<i>B. testaceus</i>		+	+	+	+		+		
<i>B. tjederi</i>	+			+			+		
<i>B. vumbanus</i>							+		
<i>B. wahlbergi</i>			+						
<i>B. walkeri</i>			+	+			+		
<i>B. weelei</i>							+	+	+
<i>B. woodi</i>								+	
<i>B. zambezinus</i>				+				+	
<i>B. zulu</i>									

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TABLE 2. Summary of months during which adults of the southern African species of *Mecoptera* have been collected.

	J	A	S	O	N	D	J	F	M	A	M	J
<i>A. gracilipes</i>	+	+	+				
<i>B. alluaudi</i>	+						
<i>B. annae</i>				+			
<i>B. armatus</i>	+	+					
<i>B. bullatus</i>			+				
<i>B. byersi</i>				+	+		
<i>B. capensis</i>	+	+					
<i>B. caprai</i>			+				
<i>B. cottrelli</i>					+		
<i>B. gessi</i>						+	
<i>B. kimminsi</i>		+		+	+		
<i>B. kunenensis</i>				+			
<i>B. natalensis</i>			+	+			
<i>B. nebulosus</i>	+	+	+		+		
<i>B. peringueyi</i>	+	+	+	+	+	+	+
<i>B. peterseni</i>		+	+				
<i>B. pinguipalpi</i>			+				
<i>B. pondoensis</i>	+						
<i>B. selysi</i>	+	+	+				
<i>B. smithersi</i>	+	+					
<i>B. sobrinus</i>		+					
<i>B. solitarius</i>		+					
<i>B. testaceus</i>	+	+	+	+	+		
<i>B. tjederi</i>	+	+					
<i>B. vumbanus</i>		+					
<i>B. wahlbergi</i>			+				
<i>B. walkeri</i>		+		+	+	+	
<i>B. weelei</i>		+	+	+			
<i>B. woodi</i>		+	+				
<i>B. zambezinus</i>				+			
<i>B. zulu</i>	+	+			+	+	

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